

and shorter spikes (10–15 mm. long), the spikelets closely appressed to the rachis. The second differs in having very slender spreading spikes with distant appressed spikelets. *B. annua* resembles *B. filiformis* in the form of the inflorescence, but that species is strictly perennial.

ZOOLOGY.—*A restudy of Filariopsis arator Chandler, 1931, with a discussion of the systematic position of the genus Filariopsis van Thiel, 1926.*<sup>1</sup> EVERETT E. WEHR, Bureau of Animal Industry. (Communicated by ELOISE B. CRAM.)

Van Thiel (1926)<sup>2</sup> proposed the genus and species *Filariopsis asper* for nematodes collected from the lungs of a “roaring monkey” (*Mycetes seniculus*) by Dr. C. Bonne in Surinam, British Guinea. Five years later, Chandler (1931)<sup>3</sup> described a second species *F. arator* for nematodes collected from the lungs of a South American monkey (*Cebus* sp.) by Dr. W. H. Taliaferro in Chicago, Illinois. Van Thiel referred the genus *Filariopsis* to the superfamily Filarioidea without assigning it to a family. Chandler, however, created the family Filariopsidae solely for its reception.

The present writer has made a restudy of the type specimens of *Filariopsis arator* Chandler, 1931. The results of this study have made it necessary to revise the original description of this species in certain respects. It has also made it possible to include a discussion of the cephalic papillae which have not been described in the literature.

#### RESTUDY OF FILARIOPSIS ARATOR

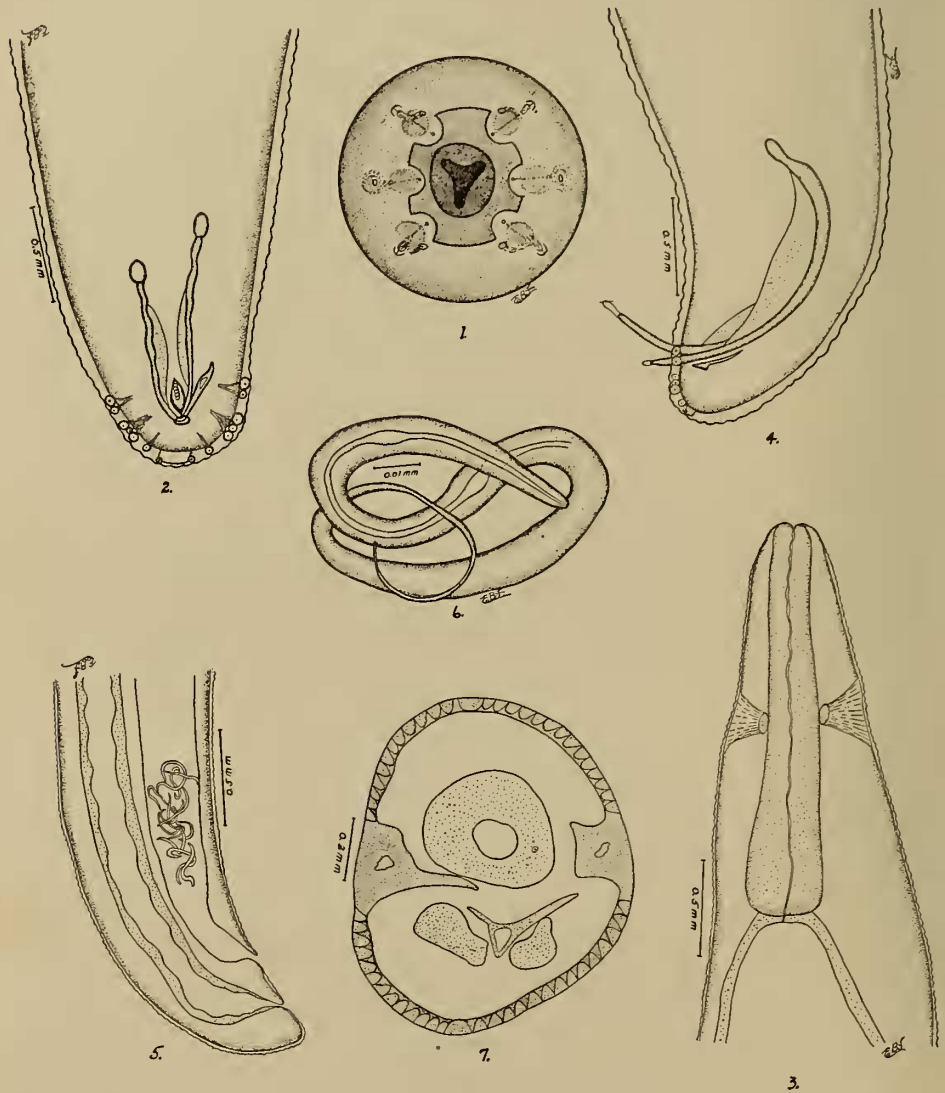
In the original descriptions it was stated that the oral opening was surrounded by 3 either “conspicuous” (*F. asper*) or “very inconspicuous” (*F. arator*) lips. According to the present writer, the head of *Filariopsis arator* is provided with 2 lateral trilobed lips (Fig. 1) on which are located a number of papillae. These papillae, numbering 14 in all, are divided, according to their mode of innervation, into 2 circles: An external circle of 8 papillae arranged in 4 groups of 2 papillae each, of which the dorsodorsals and ventroventrals are slightly smaller than, and situated internal to, the laterodorsals and lateroventrals; and an internal circle of 6 papillae, consisting of 1 papilla on the anterior border of each of the 6 lobes of the 2 trilobed lips. The amphids are located posterior to the internolateral papillae.

<sup>1</sup> Received June 7, 1934.

<sup>2</sup> VAN THIEL, P. H. *On some filariae parasitic in Surinam mammals, with the description of Filariopsis asper n. g., n. sp.* Parasitology 18: 128–136. 1926.

<sup>3</sup> CHANDLER, A. C. *New genera and species of nematode worms.* Proc. U. S. Nat. Mus., (2866), 78: 1–11. 1931.

The anterior extremity of *F. arator* (Fig. 3) was not figured by Chandler, but it is similar to that of *F. asper* as figured by van Thiel.



Figs. 1-7.—*Filariopsis arator*. Fig. 1.—Head, en face view. Fig. 2.—Male tail, ventral view. Fig. 3.—Anterior extremity, dorsoventral view. Fig. 4.—Male tail, lateral view. Fig. 5.—Female tail, lateral view. Fig. 6.—First-stage larva. Fig. 7.—Cross section of body just back of excretory pore, showing excretory canal and the 2 subventral excretory cells on each side of it.

The clavate esophagus is short and muscular, and the broad, thick-walled intestine contains multinucleated cells. Two subventral ex-

cretory cells extending from the excretory pore posteriorly along each lateral side of the excretory canal were found in *F. arator*.

The caudal extremity of the male was described and figured by Chandler as lacking caudal alae and caudal papillae. Present observations indicate that alae are apparently absent or very poorly developed, and that there are 7 pairs of caudal papillae (Figs. 2 and 4) arranged in 4 groups and situated along the lateral and posterior margins of the body. The most anterior group on each side is composed of 2 papillae, the next of 3 papillae, and the last 2 groups 1 papilla each. Each papilla is joined to the body proper by a very weakly developed bursal ray. In the 2 male specimens available for study, the 2 approximately equal spicules do not appear to be joined together by a membrane, but each spicule is provided on its inner border with a wing-like membrane extending for about the middle two-thirds of its length. The so-called gubernaculum, boat-shaped in ventral view, appears in lateral view as an elongated cutinous plate with the distal end presenting a hook-like structure on its lower surface.

The vulva of the female of *F. arator* (Fig. 5) is located just anterior to the anal opening; that of *F. asper* occupies a similar position, according to van Thiel.

The first-stage larva (Fig. 6) is about  $300\mu$  long and 10 to  $11\mu$  wide, with the anterior end slightly attenuated and the tail very long, slender, and pointed at the tip. The esophagus extends about  $\frac{1}{3}$  the total length of the body, with a swelling near the equator and another at the posterior end. In general body form, the first-stage larva of *F. arator* is similar to that of *F. asper*.

As a result of the present morphological study there seems to be no reason to believe, as Chandler did, that the 2 above species may eventually have to be placed in different genera. The male of *F. asper* has been described by van Thiel as possessing small caudal alae and 5 pairs of caudal papillae; it differs from that of *F. arator*, therefore, chiefly in the number of caudal papillae, since, according to van Thiel's figure of the male tail of *F. asper* the caudal alae, if present at all, are much reduced. Both species have similar spicules; *F. asper*, however, is described as having 2 gubernacula and *F. arator* as having only one.

#### SYSTEMATIC POSITION OF THE GENUS FILARIOPSIS VAN THIEL, 1926

Van Thiel did not state the reasons for his conclusion that the genus *Filariopsis* possesses filarioid affinities. As one of the characters of this genus, he mentioned the presence of microfilariae and, in all

probability, his belief that the young of this species were true microfilariae caused him to allocate this genus to the Filarioidea. None of the other characters of this genus mentioned by van Thiel, namely, (1) cuticle covered with conical protuberances, (2) situation of vulva close to anus, and (3) equality of 2 spicules, suggest filarioid affinity as the superfamily Filarioidea is defined today. Chandler debated whether to place the genus *Filariopsis* in the Spiruroidea or the Filarioidea, but finally decided tentatively to include it in the Filarioidea because of the absence of paired lips, the long and slender body, the position of the adults in the lungs of the host, and the presence of "microfilaria-like" embryos in the uteri, although, as he said, the genus differs from the other members of the Filarioidea in having the vulva near the anus, in the short muscular esophagus, and in the "non-coiled tail of the male."

As a result of his recent study of *F. arator*, the present writer has come to the conclusion that the genus *Filariopsis* belongs to the Metastrongyloidea rather than to the Filarioidea. This conclusion is based on the following findings: The microfilaria-like embryos referred to by Chandler and van Thiel are not true microfilaria as they possess a distinct esophagus with 2 swellings, one near the equator and the other at the posterior end; the presence of 2 subventral excretory cells and of multinucleated intestinal cells in the adult (the present writer has demonstrated the presence of similar cells in *Metastrongylus elongatus*), and the character of the adult esophagus and the male tail. The presence of subventral excretory cells is a characteristic of the Strongylata, according to unpublished observations made by Dr. B. G. Chitwood, Zoological Division, Bureau of Animal Industry. The polymyarian condition of the somatic musculature, the absence of longitudinal cuticular markings, and the character of the esophagus of the first-stage larva tie *F. arator* to the Metastrongyloidea, and the much reduced bursa and bursal rays allocate it to the family Pseudaliidae and the subfamily Filaroidinae.

#### SUMMARY

A restudy of the type specimens of *Filariopsis arator* Chandler, 1931, has made it possible to add to the previous description of this nematode. From this new evidence and a critical analysis of the earlier descriptions of *F. arator* and *F. asper*, it is concluded that the genus *Filariopsis* belongs in the superfamily Metastrongyloidea, family Pseudaliidae, subfamily Filaroidinae.